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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,591	11/06/2001	Paul R. Margiott	C-2451	7404

7590 04/23/2004

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EXAMINER	
ALEJANDRO, RAYMOND	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 04/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/992,591	MARGIOTT ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This communication is in response to the amendment filed 02/19/04. Applicant's arguments filed along with the foregoing amendment have been entirely examined and scrutinized but they are not convincing. Thus, the present claims are finally rejected as the 35 USC 103 rejection still stands for the reasons of record:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-17 rejected under 35 U.S.C. 103(a) as being unpatentable over Takechi et al 5154986 in view of Cameron 4537839.

The present application is directed to a procedure for shutting down a fuel cell and fuel processing system.

With respect to claims 1 and 15:

Takechi et al disclose shut-off device for fuel cell system wherein in order to achieve a safe shut-down, the fuel cell system must be left in such a state after the cessation of operations that there will be no problem in restarting operations for the fuel cell system (COL 3, lines 59-65). In order for there to be a safe shut-down, the following conditions must be met depending n the type of system to which the control system unit is applied (COL 3, lines 65-68), particularly: condition 3, new air or inert gas beyond certain level must be present in the fuel cell (COL 4, line 3-4), wherein condition 3 indicates that water vapor remains inside the fuel cell. If water vapor remains within the fuel cell in the electrolyte, this water can cause early deterioration of the fuel cell. Safe shut down is accomplished by connecting the four-way valve 2 to the outside air and by using blower 22 to force new air into the cell, or to introduce an inert gas into the cell for a set period of time following the shut-down of the fuel cell (COL 4, lines 26-35). Additionally, instead of eliminating (*water migration is reduced*) the water vapor by performing the above operation for a set period of time, it is also within the scope of the invention to place a water vapor sensor in the fuel cell and use the detection signal from that sensor to halt the purging operation and ensure a safe shut-down (COL 4, lines 35-41). It is also disclosed that cool outside air is introduced to cool down and ensure a safe shut down (COL 4, lines 47-50). It is disclosed that the operation of the fuel cell is halted while turning off the external load through a main switch (COL 1, lines 29-35).

Takechi et al disclose that new air or inert gas beyond a certain level must be present in the fuel cell (COL 4, lines 3-4); Takechi et al also describe that safe shutting is accomplished by connecting the four-way valve 24 to the outside air and by using a blower 22 to force new air into the cell, or to introduce an inert gas such as nitrogen into the cell for a set of period of time following the shut-down of the fuel cell (COL 4, lines 29-38). It is further disclosed that instead of eliminating the water vapor, it is also within the scope of the invention to place a water vapor sensor in the fuel cell and use the detection signal from that sensor to halt the purging operation and ensure a safe shut-down (COL 4, lines 35-42).

Figure 1 below illustrates the fuel cell processor 1 for generating hydrogen. Connected in parallel to fuel cell 2 is a storage battery 3. A load 4 is connected to both fuel cell 2 and the battery 3 (COL 2, lines 23-31). A fuel tank 8 storing methanol fuel for the burner 7m where it is burned with the aid of air supplied (COL 2, lines 40-48). 7M and 7H also represent burners (COL 2, lines 37-39).

FIG. 1

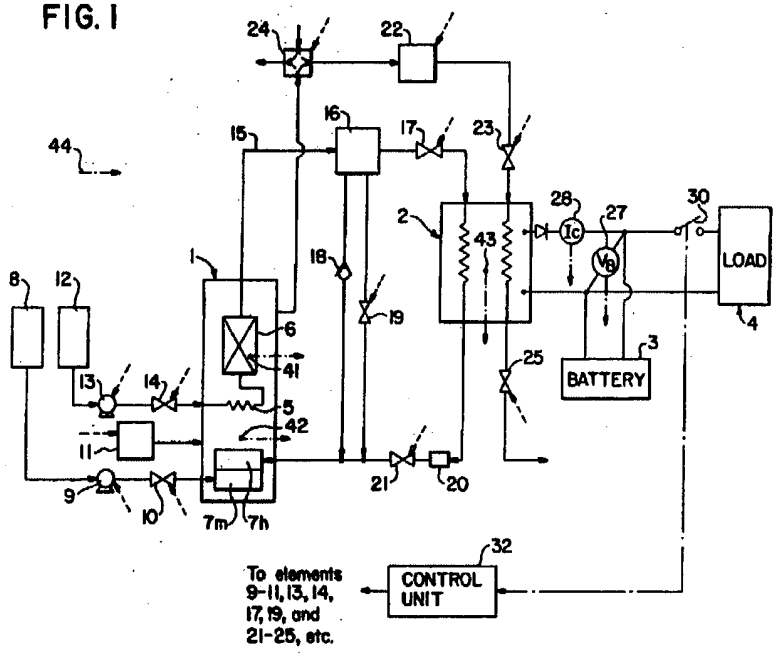


Figure 3 below depicts the shut-down method for a fuel cell system:

FIG. 3

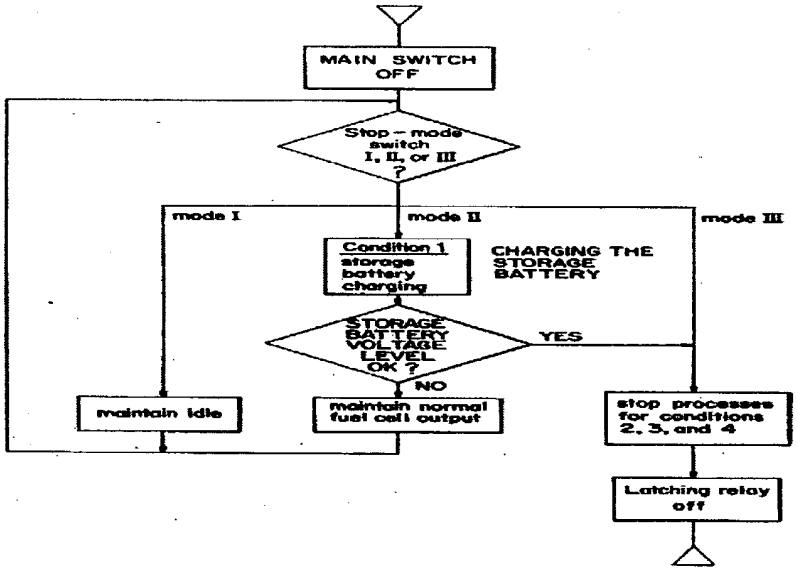
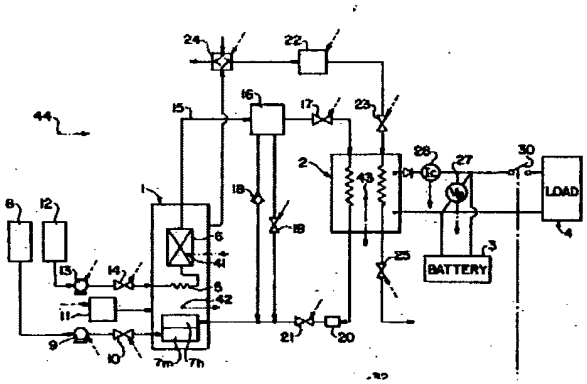
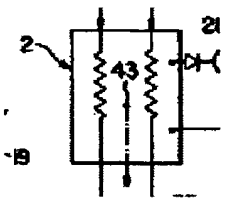


Figure 1 and its enlarged section below shows the fuel cell structure. *It is noted that the top and bottom part of feature 2 represents the two fuel cell ends.* It is also disclosed heating burners 7M and 7H making hot gases (COL 2, lines 35-45). *These burners are in fluid communication with the fuel cell 2.* It is also disclosed that valve 24 is connected thereto, allowing the selection of either low temperature atmospheric air or high temperature air from fuel processor 1 (COL 2, lines62-67).





Takechi et al is applied, argued and incorporated herein for the reasons above. However, Takechi et al do not expressly disclose the specific purging steps.

Cameron discloses a fuel cell that may be purged with inert gas and/or preheated and/or maintained at an elevated temperature by combusting the hydrogen fuel with air and passing the combusting product gases either through the cell or through a heat exchanger for imparting heat (ABSTRACT). Preferably the combustor includes a catalyst. The hydrogen can either by taken directly from the fuel supply or the waste hydrogen. If the product gases are to be passed into the cell, the stoichiometry of the combustion should be controlled so that hydrogen is absent (ABSTRACT). *Thus, the concentration of hydrogen is below 4 %.*

In light of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to perform the specific purging steps of Cameron in the fuel cell system of Takechi et al because Cameron teaches that his invention provides an inert gas fuel cell purge which is independent of the availability of an external inert gas source; and it provides for the temperature of the fuel cell to be maintained at an uniform temperature. Additionally, Cameron teaches that it has been found that hydrogen fuel may be combusted and the combustion gases passed through the fuel cell to act as the purge. Thus, the combustion product gases are for use either as a fuel cell purge stream or as a heat exchange medium for the fuel cell reactants for heating or maintaining the fuel cell at constant temperature.

Response to Arguments

4. Applicant's arguments filed 02/19/04 have been fully considered but they are not persuasive. The main contention of applicants' arguments is premised on the assertion that the prior art fails to teach the step of purging the reformer of residual hydrogen by flowing air through the reformer as well as purging the anode flow field purge. Nevertheless, this assertion is respectfully disagreed with because the primary reference discloses that:

i) in order for there to be a safe shut-down, the following conditions therefore must be met depending on the type of system to which the control unit is applied: 3. new air or inert gas beyond a certain level must be present in the fuel cell (Takechi et al, COL 4, lines 3-4);

ii) inert gas beyond a certain level must be present in the catalyst layer of the fuel processor, so that activity in the reaction layer ceases (Takechi et al, COL 4, lines 5-9);

and, iii) that safe shutting is accomplished by connecting the four-way valve 24 to the outside air and by using a blower 22 to force new air into the cell, or to introduce an inert gas such as nitrogen into the cell for a set of period of time following the shut-down of the fuel cell (Takechi et al, COL 4, lines 29-38). It is further disclosed that instead of eliminating the water vapor, it is also within the scope of the invention to place a water vapor sensor in the fuel cell and use the detection signal from that sensor to halt the purging operation and ensure a safe shut-down (Takechi et al, COL 4, lines 35-42);

thus, having shown that the primary references clearly teaches the use of air thereto, it is contended that the air being passed to assist cooling or reducing temperature in the fuel processor (where the reforming process take places), to certain degree, may pick or purge residual hydrogen from the reformer (the fuel processor) because the transport mechanism of the air

flowing therethrough provides sufficient momentum energy to, at least to some extent, remove or purge any residual material in the fuel processor. That is to say, the examiner verily believes that such cooling air employed therein to reduce temperature necessarily causes the incidental (secondary) effect of purging residual material due to the energy level associated with the transport phenomenon of the flowing air. Unless applicants provide objective evidence demonstrating that such cooling air flowing through the fuel processor does not exhibit sufficient transport energy and/or does not purely behave as expected by fluid mechanic theory, the instant claims are deemed to be obvious over the prior art of record in view of the teachings above promoting the present of air. Furthermore, absent further description of the purging degree or residual removal rate in the present claims, it is additionally asserted that the cooling air passing through the fuel processor, at least, is able to carry out minor amounts of residual hydrogen therefrom, and thus, meet the necessary functional interrelationship to satisfy the claimed purging requirement.

With respect to purging the fuel cell anode flow field, the examiner wishes to point out that since the prior art of record plainly discloses that new air or inert gas beyond a certain level must be present in the fuel cell; or to introduce an inert gas such as air/nitrogen into the cell for a set of period of time (*see items i and iii above*), the prior art encompasses introducing or circulating air in the fuel cell per se. In that, it is noted that, as well known in the art, the fuel cell is composed of two major reacting (active) parts/sections: a) the cathode side and b) the anode side. Thus, it is further asserted that since the prior art discloses that air must be present in the fuel cell, it (prior art) thus envisions to force or introduce air into the fuel cell parts and *ipso facto* into both the cathode side and the anode side. In this regard, it is also noted that applicants have

presented no reasons or objective evidence to support why the prior art (Takechi et al) cannot or may not be able to introduce air in the anode flow field, or (*stated in another way*) introduce air only in the cathode side of the fuel cell.

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745